RESPONSE AND REQUEST FOR RECONSIDERATION

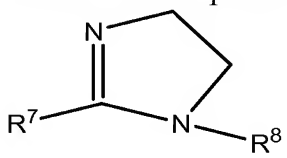
Claim Amendments

Claims 1 through 26 and 28 have been cancelled. Those claims related to the composition of matter and to lubrication generally.

Claim 27, which relates to a method of lubricating an automatic transmission, has been amended to specify:

"wherein the condensation product of a fatty acid with an ethylenepolyamine comprises at least one compound selected from the group consisting of hydrocarbyl amides, hydrocarbyl imidazolines and mixtures thereof;

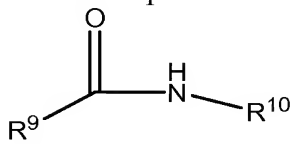
wherein the hydrocarbyl imidazoline is represented by the formula:



(III)

wherein R^7 is a linear or branched alkyl group containing 10 or more carbon atoms; and R^8 is a group derived from an ethylenepolyamine; and

wherein the hydrocarbyl amide is represented by the formula:



(IV)

wherein R^9 is a linear or branched alkyl group containing 10 or more carbon atoms and R^{10} is a group derived from an ethylenepolyamine."

Support for the amendment above is provided by the language of claim 1 as previously presented. In addition support is provided in paragraph [0035] of the application as filed.

Claim 27 has also been amended to specify about 0.03 wt % to 1 wt % of the alkyl phosphite. Support for this range is provided in paragraph [0020] of the application as filed.

Claims 29 to 46 are new. Support for these claims is provided in claims 2, 8 to 18 and 28 respectively. The language of claims 29 to 41 is substantially similar to claims 2, 8 to 18 and 28 except the claim type and dependency has been changed from a composition to a method claim. In addition, claim 39 (substantially based on previously claim 17 now specifies out 0.03 wt % to 1 wt % of the alkyl phosphite).

Claim 42 is a new independent claim substantially similar to claim 27, except about 0.05 wt % to about 0.6 wt % of a condensation product of a fatty acid with an ethylenepolyamine is specified. Support for the modified range in claim 42 is provided in paragraph [0036] of the application as filed.

Claim 43 is a new dependent claim. The claim specifies the condensation product of a fatty acid with an ethylenepolyamine is present at 0.05 to 0.6 weight percent of the lubricating oil composition, and wherein the alkyl phosphite is present at 0.05 wt % to 0.7 wt % of the lubricating oil composition. This claim is supported by paragraphs [0020] and [0036] of the application as filed.

Claim 44 is supported by paragraph [0036] of the application as filed.

Claims 45 and 46 are supported by the ranges taught in paragraph [0036] in combination with the sentence "It is to be understood that the upper and lower amount, range, and ratio limits set forth herein may be independently combined" from paragraph [0113].

In view of the remarks above, the amendments are fully supported by the application as filed and do not add subject-matter.

Remarks

The Examiner has maintained the rejection over Ward in light of the fact that Ward's disclosure of a friction modifier in Supplement A (page 27, line 19 [or line 18]). The Examiner has also rejected the claims because the condensation product of ethylenepolyamine is supposedly not reasonably commensurate in scope with the scope of the claims because each example only contains 0.2 wt % of friction modifier. The Examiner also indicated that the amount of friction modifier could be changed to control the effect of friction and it would have been obvious to one of ordinary skill to utilize suitable amounts of friction modifier (whether more or less) to control the S1/D values. The Applicant respectfully traverses.

The remarks below will demonstrate that it is the selection of both the claimed C_{12-30} alkyl phosphite and the friction modifier, rather than just the amount of friction modifier, that is important for the performance of a lubricant in an automatic transmission. Accordingly, it is submitted that all remaining rejections will be obviated.

The importance of the selection of both the presently claimed phosphite and the presently claimed ethylenepolyamine has been highlighted at two separate stages of prosecution. On May 1, 2006 inventor Mr. Sumiejski submitted comparative data demonstrating the unexpected improved performance of the claimed C_{12-30} alkyl phosphite over the materials of Ward. The comparative data from the declaration submitted by Mr. Sumiejski is presented below.

Data from Tables Submitted by Inventor Sumiejski declaration of May 1, 2006

Formulation Components (parts by weight)	Comparative Ex 3 of US 6,103,673 (CE1)	Example of the Invention (IVEX1)
Oil of lubricating viscosity	100	100
Shear stable dispersant viscosity modifier	7.4	7.4
Overbased calcium sulphonate, including 0.42 parts diluent oil	0.84	0.84
Overbased calcium salicylate, including 0.16 parts diluent oil	0.40	0.40
Dibutyl hydrogen phosphite	0.15	0.15
Alkyl hydrogen phosphite		
C6 alkyl	0.08	—
C14 alkyl	—	**0.08**
Phosphoric acid (85 %)	0.04	0.04
Borated alpha olefin epoxide	0.2	0.2
1-hydroxyethyl-2-heptadecenyl imidazoline	0.02	0.02
Amine dispersants, mixture of borated, non-reacted and species reacted with CS_2	2.0	2.0
Antioxidants	0.9	0.9
Seal swell agent	0.6	0.6
Corrosion inhibitor	0.03	0.03
Dye	0.025	0.025
Antifoam agents	460 ppm	460 ppm
Additional diluent oils	3.8	3.8
Wear Results		
Plate wear (mm)	0.42	0.20
Wear visual analysis	medium discoloration	light discoloration
Anti-Shudder Performance		
Total hours	85	115
Slope type	negative	not negative

The data presented by Sumiejski demonstrates that C_{12-30} alkyl phosphite imparts reduced wear and improved anti-shudder performance compared with a comparative example taken from US 6,103,673.

Later in the prosecution, the Examination focused on breadth of description of component (b), i.e., the condensation product of the fatty acid with a polyamine. During prosecution, the scope of the polyamine has been amended to particularly specify ethylenepolyamines. As part of the prosecution, the Applicants have also demonstrated the significance of selecting this correct friction modifier. This data was submitted in a declaration by Dr. Patterson on March 26, 2008. For convenience, this data is reproduced below:

Formulation Components (by weight)	Comparative Ex 1	**Inventive Ex 2**	Comparative Ex 3	Comparative Ex 4
Oil of lubricating viscosity	85.30	85.30	85.30	85.30
Dispersant viscosity modifier, including 26.5% oil	7.50	7.50	7.50	7.50
Red dye	0.025	0.025	0.025	0.025
Borated amine dispersant, including 33% oil	3.50	3.50	3.50	3.50
Diluent oil	0.46	0.46	0.46	0.46
Dibutyl hydrogen phosphite	0.20	0.20	0.20	0.20
Phosphoric acid (85%)	0.04	0.04	0.04	0.04
Borated alpha olefin epoxide	0.20	0.20	0.20	0.20
Antioxidants	1.10	1.10	1.10	1.10
Alkyl hydrogen phosphite	0.10	0.10	0.10	0.10
Seal swell	0.60	0.60	0.60	0.60
Corrosion inhibitor	0.03	0.03	0.03	0.03
290 TBN Calcium sulfonate; including 41% oil	0.70	0.70	0.70	0.70
Borate ester	0.05	0.05	0.05	0.05
Foam inhibitors	0.042	0.042	0.042	0.042
1-Hydroxyethyl-2-heptadecenyl imidazoline	0.20			
Condensation product of fatty acid with polyamine		**0.20**		
Oleyl amide			0.20	
Glycerol monooleate				0.20
Analyticals				
BORON %	0.085	0.085	0.087	0.086
CALCIUM %	0.075	0.076	0.077	0.076
PHOSPHORUS %	0.043	0.044	0.044	0.044
SULFUR %	0.153	0.153	0.156	0.154
VISC @ 100°C cSt	6.798	6.729	6.734	6.724

Data Obtained by Dr, Patterson

Cycles	Comp Ex 1	**Inv. Ex 2**	Comp. Ex 3	Comp. Ex 4
	S1/D Ratio			
25	0.889	1.052	1.08	1.042
100	0.824	0.965	1.035	1.028
200	0.815	0.944	1.035	1.029
400	0.798	0.93	1.022	1.022
600	0.798	0.951	1	1.014
800	0.798	0.943	0.985	0.993
1000	0.785	0.943	0.978	1.015
2000	0.808	0.978	0.956	1
4000	0.829	0.971	0.978	1.03
6000	0.824	0.95	1	1.06
8000	0.841	0.944	1.014	1.058
10000	0.842	0.944	1.007	1.05
12000	0.837	0.93	0.986	1.042
14000	0.867	0.924	0.986	1.028
16000	0.875	0.959	0.979	1.021
18000	0.883	0.959	0.966	1.007
20000	0.904	0.966	0.972	1.014
	Average static coefficient of friction (from Fig 2)			
	~0.09	~0.13	~0.13	~0.14

Dr. Patterson noted that in the Friction Durability Test it is desired that the ratio S1/D be between 0.9 and 1.0 throughout the 20,000 cycles of the test (after an initial break-in period). It is also desired that the static friction be high, in the range of about 0.12 and above. Among the formulations tested, only the formulation containing the fatty acid/polyamine friction modifier showed acceptable performance. Accordingly, the selection of the type of friction modifier is important to the performance of a lubricant in an automatic transmission.

While Ward (WO00/70001) discloses in Supplement A a friction modifier that is within the scope of the present definition of the condensation product, Ward does not teach, suggest or otherwise disclose the selection of the condensation product of a fatty acid with an ethylenepolyamine in combination with the C_{12-30} alkyl phosphite as presently claimed.

A person of ordinary skill in the art, starting from Ward, would have had to perform more than routine experimentation to arrive at the present invention. The reason is because he would need to (i) select from a list of additives taught in continuously variable transmission lubricants the correct friction modifier (without the knowledge provided the declaration of Patterson). Then he would have to select from a list of antiwear agents the correct chemistry (without the knowledge provided by the declaration by inventor Sumiejski discussed above). Then the skilled person would have to combine the two additives in an automatic transmission lubricant.

Before the priority date of the present invention, a person of ordinary skill in the art would have been aware of the standard textbook "Automotive Lubricants Reference Book", by A. J. Caines and R. F. Haycock, copyright 1996 (see attached). Specifically from page 12 there is a sentence stating:

"The degree to which lubrication can reduce friction depends not only on the choice of lubricant, but also on the particular situation and circumstances."

With that in mind, the person of ordinary skill would know, before attempting to develop a lubricant for an automatic transmission, that there are a number of difficult choices to be made.

Would the person of ordinary skill in the art, in the field of automatic transmission fluids, begin formulating with a lubricant disclosed by Ward as a continuously variable transmission lubricant? If so, would this person have purposely selected one friction modifier over all of the others described in other examples of Ward? The answer is no, because, as described on pages 88 and 89 of the standard textbook referred to previously, a person of ordinary skill would know that there are two types of friction modifier: friction reducers (see page 88, last two lines to line 10 on page 89), and friction enhancers (see page 89 second paragraph). Within each of those two classes of friction modifier there are a large number of possible friction modifiers. On page 89 there is a statement:

"By carefully balancing combinations of anti-wear and friction-reducing additives with those that promote high coefficients of static friction, it is possible to formulate transmission fluids that provide a positive lock-up when clutches are applied but one which is not too harsh. It is important that these properties can be retained over along service life for the lubricant and not just for initial properties of new fluid, so careful selection of possible additives must be made."

Thus the skilled person would have been aware, from the standard textbook, that careful balancing of additives is required. This careful balancing indicates more than routine experimentation in formulating transmission lubricants. To a person of ordinary skill in the art careful balancing means careful selection of the most appropriate chemistry from two long lists of friction modifiers and antiwear agents. The need for careful selection of the presently claimed condensation product, as noted by Dr. Patterson, follows from the conclusion of Dr Patterson that only the presently claimed condensation product had the S1/D ratio in the range of 0.924 to 0.978 and the static coefficient of friction between about 0.118 and 0.141. This implies that only this selected friction modifier would have the overall performance required for an automatic transmission fluid.

These performance results, by the selection of friction modifiers, are not predictable. Of the other materials tested by Dr. Patterson, the closest other material, in

terms of performance, was the oleyl amide of Comparative Example 3, and that exhibited several measurements of S1/D in excess of 1.0, indicating that torque increases at the end of the clutch engagement which can potentially cause shudder. Comparative Example 3 also showed poor green (break in) friction performance. Moreover, the most similar material in terms of structure, the ethyoxylated fatty amine of Comparative Example 1, performed very poorly, exhibiting both a very low S1/D and static coefficient of friction.

With regard to the issue of concentrations of the friction modifiers, the performance of the friction modifiers evaluated above would be expected to have the same trend at concentrations of greater than or less than the illustrated 0.2 wt % as used in Dr. Patterson's declaration. The reason a skilled person would expect the same general performance is because the friction modifier selected would either be a friction reducing additive or a friction enhancing additive. The friction reducing or friction enhancing of the condensation product of a fatty acid with an ethylenepolyamine.is a performance feature that would be expected to remain similar over the scope of the claimed range of about 0.03 wt % to about 1 wt %. As an illustration of this point, Mr. Sumiejski submitted a declaration on June 1, 2007 demonstrating that compositions containing the claimed condensation products at various concentrations provide acceptable automatic transmission lubricants. For convenience, the lubricant compositions and data obtained by Mr. Sumiejski are presented below:

Formulation Components (parts by weight)	Comparative Example	Example of the Invention			
	EX13 From WO 00/70001 (CE1)	EX1	EX2	EX3	EX4
Borated Dispersant[1] (wt %)	3.5	3.5	3.5	3.5	3.5
Borate Ester[2] (wt %)	0.2	0.2	0.2	0.2	0.2
Condensation Product of Fatty Acid with a Polyamine[3] (wt %)	0	**0.03**	**0.15**	**0.3**	**1.5**
Rest of additives and base oil from Example 13 of WO 00/70001	Balance to 100 wt %				

		Anti-Shudder Performance at End of Test	Plate Wear	
Example	Total Test Time (hr)	Slope Type	Wear (mm)	Wear Visual Analysis
CE1	55	Negative	0.301	Excess plate wear and dark discoloration of plates
EX1	75	Negative	0.300	Medium plate wear and light discoloration
EX2	95	Not Negative	0.190	Light wear and light discoloration
EX3	115	Not Negative	0.153	Light wear and light discolouration
EX4	115	Not Negative	0.069	No wear and no discoloration

The data demonstrates that in addition to the 0.2 wt % treat rate of the condensation product used in the comparative study by Dr. Patterson, the condensation product also provides benefit at treat rates of 0.03 wt %, 0.15 wt %, and 0.3 wt % (see EX1 to EX3 above). In fact the performance the condensation product even provides benefit out to 1.5 wt % as is noted in EX4. Thus the Applicant submits that for the technical reasons provided above, that the claimed range for the ethylenepolyamine condensation product is reasonably commensurate in scope with the scope of the claims. The Examiner is therefore respectfully requested to withdraw this rejection.

The Examiner also indicated that the amount of friction modifier could be changed to control the effect of friction and it would have been obvious to one of ordinary skill to utilize suitable amounts of friction modifier (whether more or less) to control the S1/D values. However, in view of the discussion above relating to friction reducer and friction enhancer friction modifiers, it is submitted that more than just modifying the amounts of friction modifier are required to control S1/D. Thus it is the selection of friction modifier that is important rather than just the amounts used. Accordingly, the Applicant respectfully requests the Examiner to withdraw the rejection based on the unwarranted assumption that merely changing the amount of friction modifier would be sufficient to control S1/D values.

For the foregoing reasons, it is submitted that all claims are novel and unobvious. Accordingly, an early and favorable reconsideration of the rejections made in the prior office actions is respectfully requested. It is believed that no additional fees are due in connection with this submission. However, any required fees or underpayment or overpayment of fees should be charged (or credited) to Deposit Account 12-2275 (The Lubrizol Corporation).

Respectfully submitted,

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